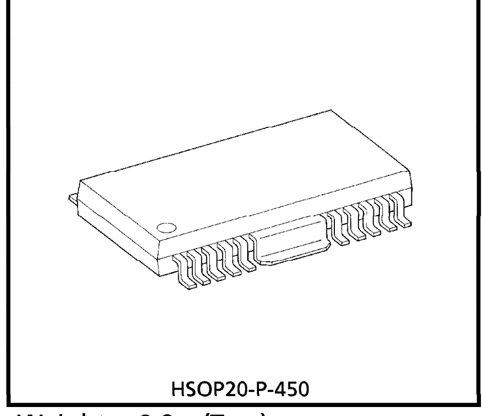
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT

TA2058F

SILICON MONOLITHIC

POWER DRIVER IC FOR CD PLAYER

TA2058F is a power driver IC developed for CD players. This IC have built-in 4 channel BTL power amplifiers which drives focus-coil and tracking coil for 3-beam pick-up head, disc motor and feed motor.



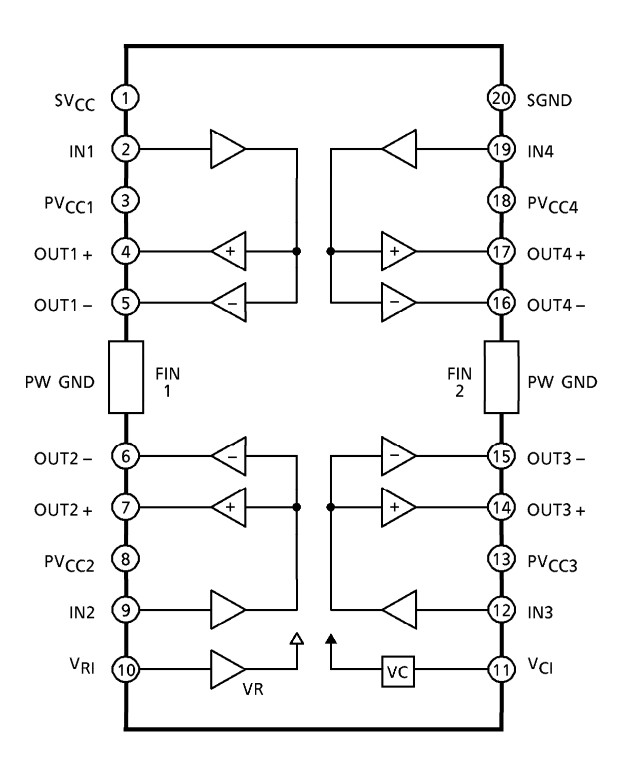
HSOP20-P-450

Weight : 0.8g (Typ.)

FEATURES

- 4 channel BTL linear divers
- Few external parts
- Fixed voltage gain
  : Gv = 15dB (Typ.)
- High output power
  : $V_{OM}1 = 5V_{p-p}$ (Typ.) $V_{CC} = 5V$, $R_L = 5OHM$
  : $V_{OM}2 = 6V_{p-p}$ (Typ.) $V_{CC} = 6V$, $R_L = 5OHM$
- Thermal shut down protector
- Input reference voltage short protector
- Small Package
  : Power-flat package 1mm pitch 20pins
- Operation Supply Voltage Range
  : $V_{CC\ (opr)} = 4.0\sim10.0V$ (Ta = 25°C)

BLOCK DIAGRAM



TERMINAL EXPLANATION

TERMINAL No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT
1	SV_{CC}	Supply terminal of small signal	
2	IN1	Input for CH1 ● Not biased inside.	IN, SGND
3	PV_{CC1}	Supply terminal of output stage for CH1 ● Supply terminal of output stage are not connected to other channel terminal.	SV_{CC}, PV_{CC}, OUT, PGND
4	OUT1 +	Non-inverted output for CH1	
5	OUT1 –	Inverted output for CH1	
FIN1	PGND	Power GND ● Connected to FIN2 and substrate.	
6	OUT2 –	Inverted output for CH2	Same as CH1
7	OUT2 +	Non-inverted output for CH2	
8	PV_{CC2}	Supply terminal of output stage for CH2	
9	IN2	Input for CH2	
10	V_{RI}	Input reference voltage ● Under condition of $V_{R1} \leqq 1.8V$, internal bias circuit is shut off.	V_{RI}, SGND, 39kΩ, 30kΩ
11	V_{CI}	Output reference voltage ● $V_{OUT} = V_{CI} = (V_{CC} - VF) / 2$	SV_{CC}, V_{CI}, SGND, 21kΩ, 21kΩ
12	IN3	Input for CH3	Same as CH1
13	PV_{CC3}	Supply terminal of output stage for CH3	
14	OUT3 +	Non-inverted output for CH3	
15	OUT3 –	Inverted output for CH3	
FIN2	PGND	Power GND	Connected to FIN1
16	OUT4 –	Inverted output for CH4	Same as CH1
17	OUT4 +	Non-inverted output for CH4	
18	PV_{CC4}	Supply terminal of output stage for CH4	
19	IN4	Input for CH4	
20	SGND	Small signal GND	

MAXIMUM RATINGS (Ta = 25°C)

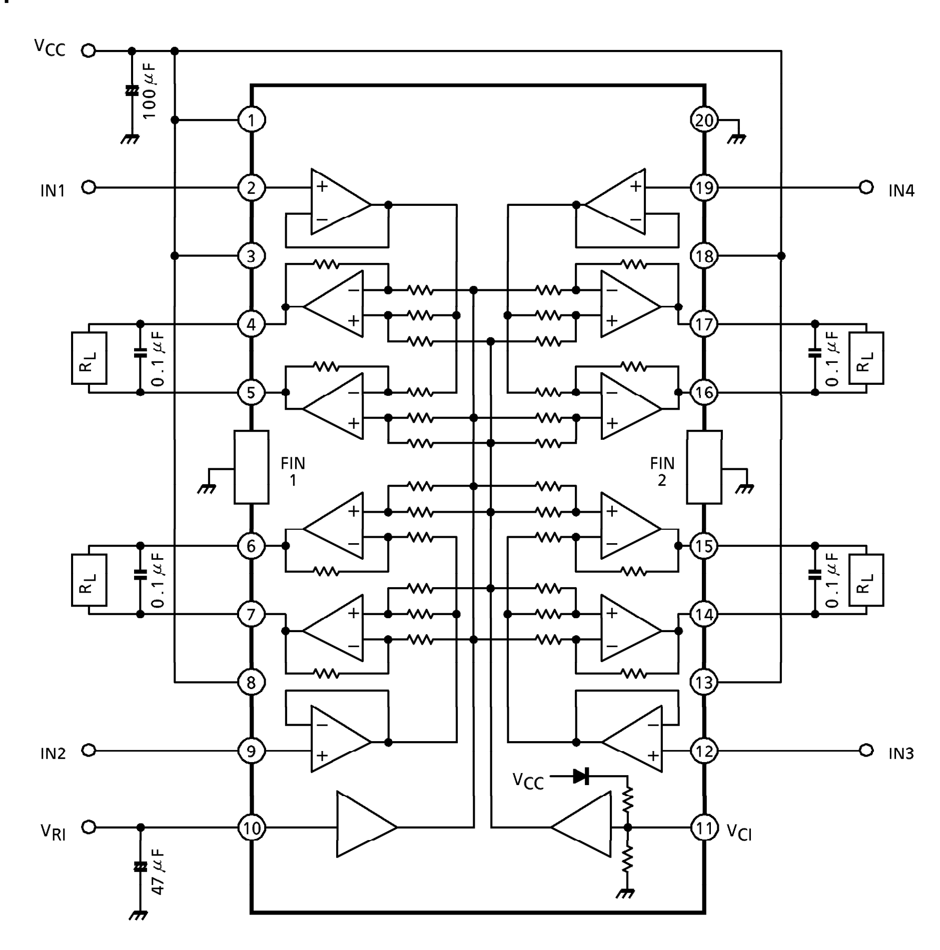
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	14	V
Power Dissipation	P_D (Note 1)	2 (Note 2)	W
Operating Temperature	T_{opr}	−30~85	°C
Storage Temperature	T_{stg}	−55~150	°C

(Note 1) : Mounted on 50mm × 50mm × 1.6mm size board with copper area 60% over.
(Note 2) : Derated above Ta = 25°C, in the proportion of 62.5mW / °C.

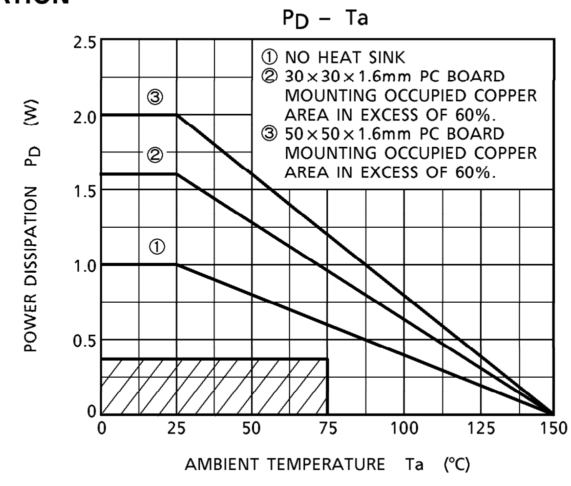
ELECTRICAL CHARACTERISTICS
(Unless otherwise specified, V_{CC} = 5V, R_L = 5Ω, Rg = 620Ω, V_{RI} = 2.1V, f = 1kHz, Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V_{CC}	—		4.0	—	10.0	V
Quiescent Current	I_{CCQ}	—	Vin = 0, R_L = OPEN	20	35	60	mA
Input Offset Current	I_{IN}	—	VIN = 2.1V	—	250	800	nA
V_{RI} Terminal Offset Current	I_{10}	—	V_{RI} = 2.1V	—	35	120	μA
Output Offset Voltage	$V_{O\ OS1}$	—	V_{CC} = 5V, Rg = 0Ω	−30	—	30	mV
	$V_{O\ OS2}$	—	V_{CC} = 8V, Rg = 0Ω	−50	—	50	
	$V_{O\ OS3}$	—	V_{CC} = 12V, Rg = 0Ω	−100	—	100	
Reference Output Voltage	V_{OUT}	—		—	2.1	—	V
Maximum Output Voltage	$V_{OM}1$	—	V_{CC} = 5V	4.0	5.0	—	V_{p-p}
	$V_{OM}2$	—	V_{CC} = 6V	5.0	6.0	—	
Voltage Gain	Gv	—	Vin = 100mV_{rms}	14.5	15.5	16.5	dB
Frequency Response	fc	—	Vin = 100mV_{rms}	—	100	—	kHz
Total Harmonic Distortion	THD	—	Vin = 100mV_{rms}	—	−50	—	dB
Slew Rate	S.R.	—	Vout = 2V_{p-p}	—	1.0	—	V / μs
Cross Talk	C.T.	—	Vout = 1V_{rms}	—	−60	—	dB
Ripple Rejection Ratio	R.R.	—	frip = 100Hz, Vrip = 100mV_{rms}	—	−60	—	dB
Thermal Shut Down Temperature	T_{TSD}	—	Chip temperature	—	150	—	°C
V_{RI}~GND Short Protection Voltage	$V_{RI\ OFF}$	—		1.4	1.6	1.8	V

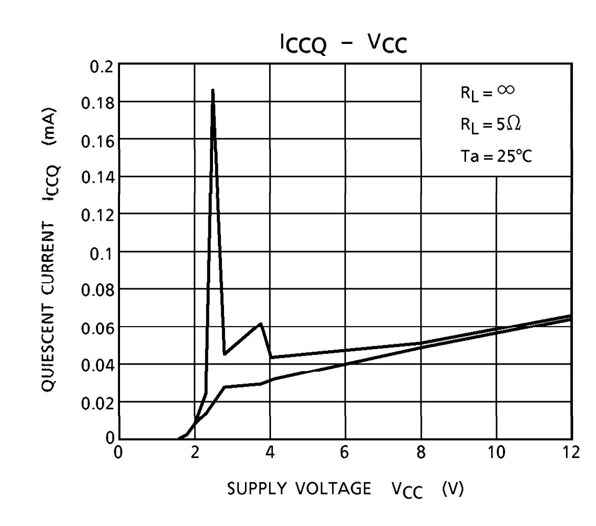
TEST CIRCUIT

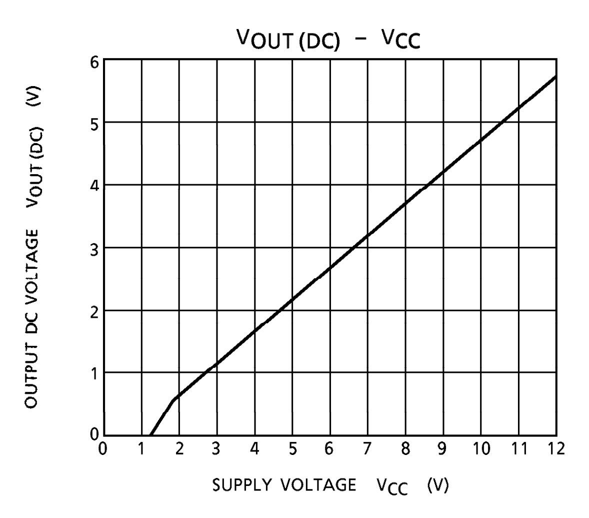


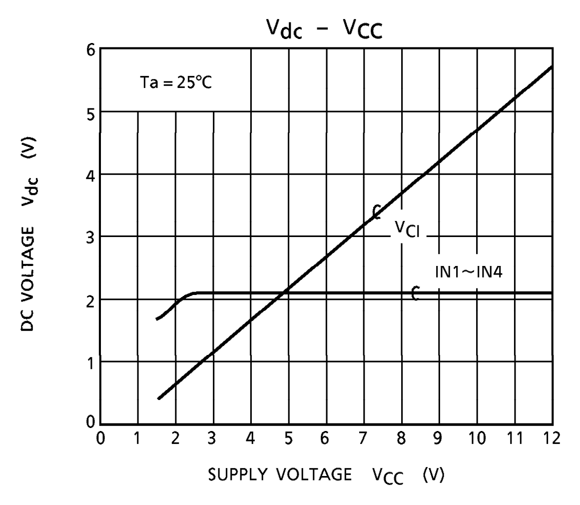
HSOP 20 POWER DISSIPATION

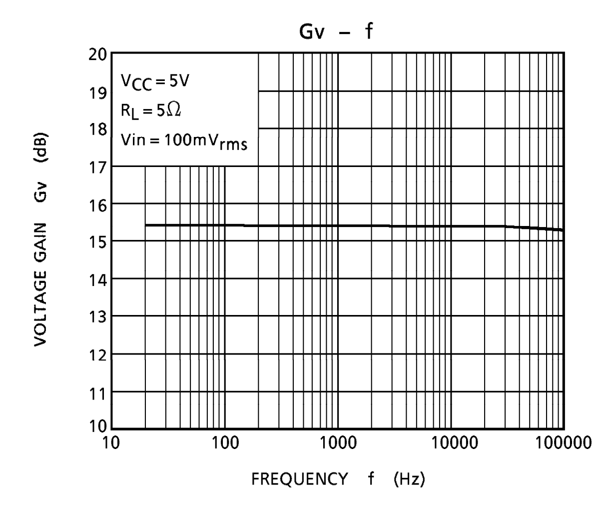


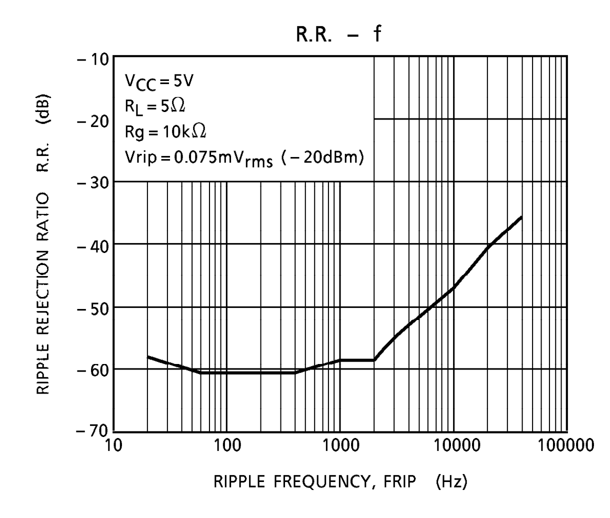
(Note) In case of normal use, power dissipation of IC only is oblique line portion.

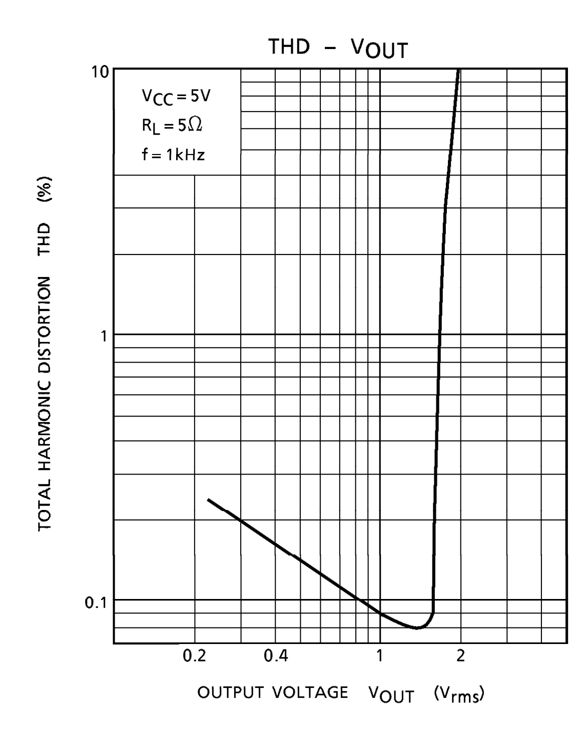

ICCQ – VCC
RL = ∞
RL = 5Ω
Ta = 25°C
QUIESCENT CURRENT ICCQ (mA)
SUPPLY VOLTAGE VCC (V)

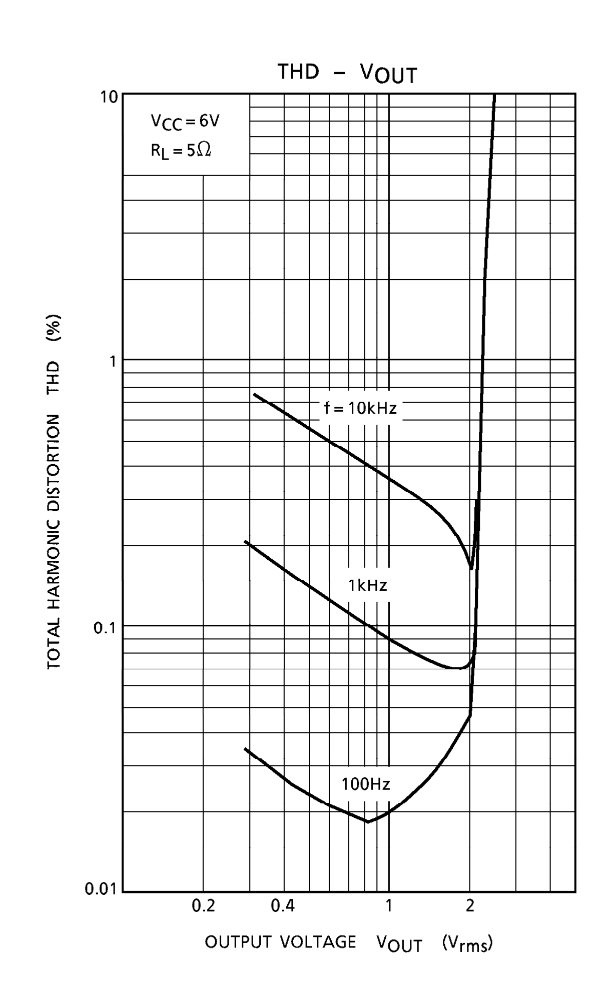

VOUT (DC) – VCC
OUTPUT DC VOLTAGE VOUT (DC) (V)
SUPPLY VOLTAGE VCC (V)

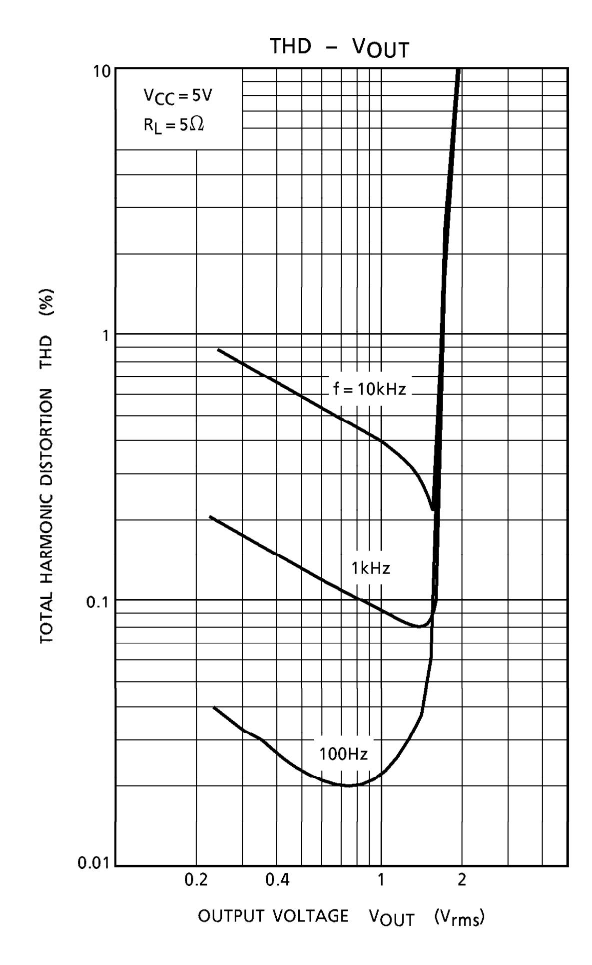

Vdc – VCC
Ta = 25°C
VCI
IN1~IN4
DC VOLTAGE Vdc (V)
SUPPLY VOLTAGE VCC (V)

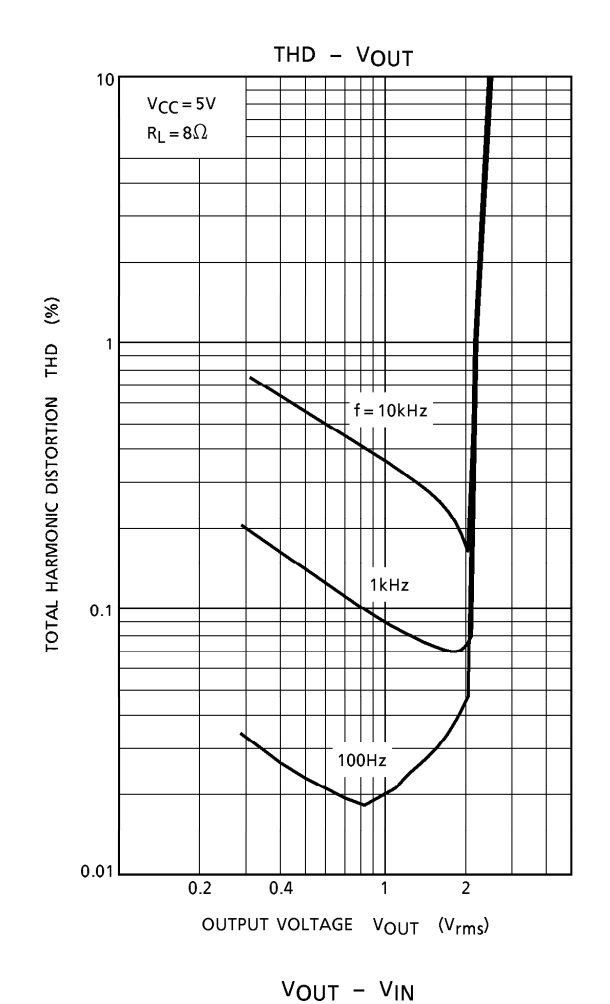

Gv – f
VCC = 5V
RL = 5Ω
Vin = 100mVrms
VOLTAGE GAIN Gv (dB)
FREQUENCY f (Hz)

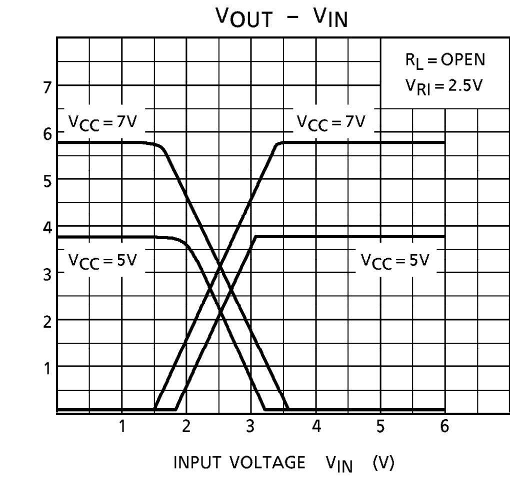

R.R. – f
VCC = 5V
RL = 5Ω
Rg = 10kΩ
Vrip = 0.075mVrms (–20dBm)
RIPPLE REJECTION RATIO R.R. (dB)
RIPPLE FREQUENCY, FRIP (Hz)

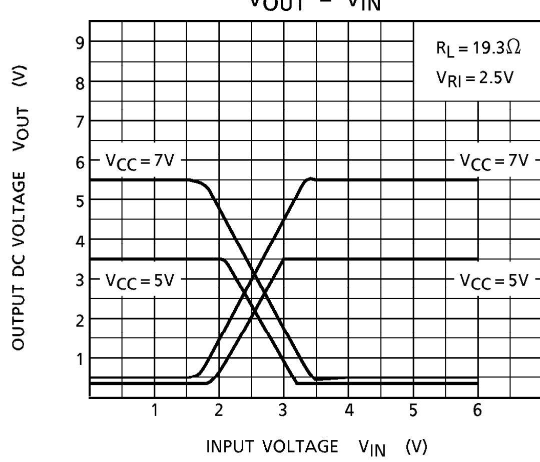

THD – VOUT
VCC = 5V
RL = 5Ω
f = 1kHz
TOTAL HARMONIC DISTORTION THD (%)
10
1
0.1
0.2
0.4
1
2
OUTPUT VOLTAGE VOUT (Vrms)

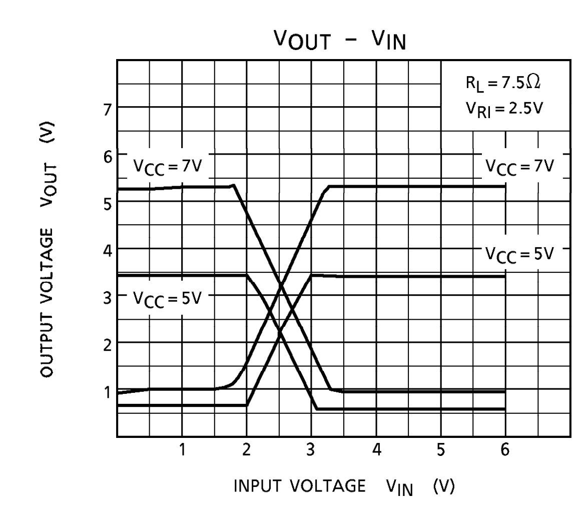

THD – VOUT
VCC = 6V
RL = 5Ω
f = 10kHz
1kHz
100Hz
TOTAL HARMONIC DISTORTION THD (%)
10
1
0.1
0.01
0.2
0.4
1
2
OUTPUT VOLTAGE VOUT (Vrms)

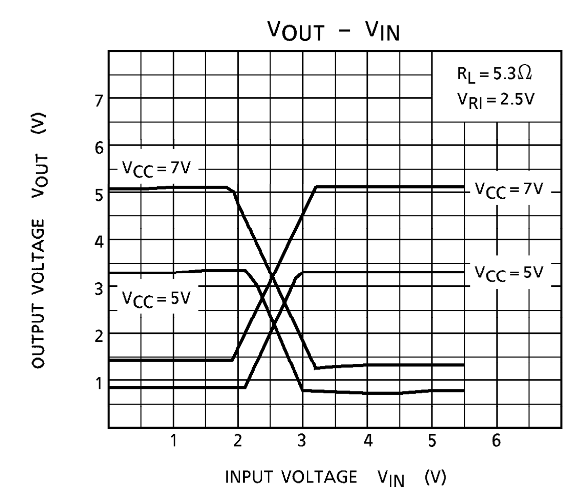

THD – VOUT
VCC = 5V
RL = 5Ω
f = 10kHz
1kHz
100Hz
TOTAL HARMONIC DISTORTION THD (%)
OUTPUT VOLTAGE VOUT (Vrms)
10
1
0.1
0.01
0.2
0.4
1
2

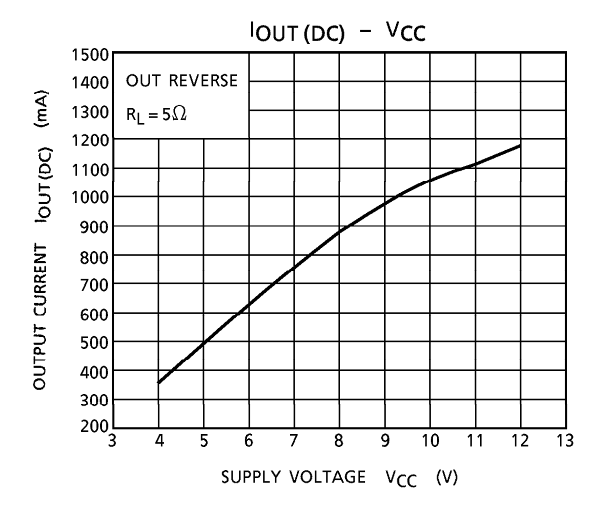

THD – VOUT
VCC = 5V
RL = 8Ω
f = 10kHz
1kHz
100Hz
TOTAL HARMONIC DISTORTION THD (%)
OUTPUT VOLTAGE VOUT (Vrms)
10
1
0.1
0.01
0.2
0.4
1
2

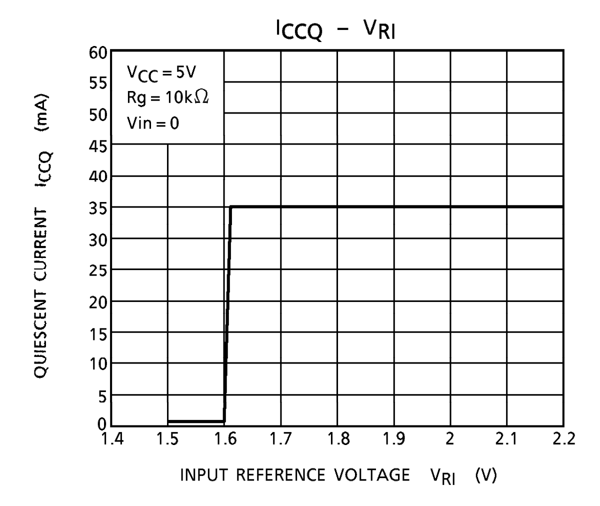

VOUT – VIN
RL = OPEN
VRI = 2.5V
VCC = 7V
VCC = 7V
VCC = 5V
VCC = 5V
OUTPUT DC VOLTAGE VOUT (V)
INPUT VOLTAGE VIN (V)
1
2
3
4
5
6
7


VOUT – VIN
RL = 19.3Ω
VRI = 2.5V
VCC = 7V
VCC = 7V
VCC = 5V
VCC = 5V
OUTPUT DC VOLTAGE VOUT (V)
INPUT VOLTAGE VIN (V)
1
2
3
4
5
6
7
8
9


VOUT – VIN
RL = 7.5Ω
VRI = 2.5V
VCC = 7V
VCC = 5V
VCC = 7V
VCC = 5V
OUTPUT VOLTAGE VOUT (V)
INPUT VOLTAGE VIN (V)
1
2
3
4
5
6
7


VOUT – VIN
RL = 5.3Ω
VRI = 2.5V
VCC = 7V
VCC = 5V
VCC = 7V
VCC = 5V
OUTPUT VOLTAGE VOUT (V)
INPUT VOLTAGE VIN (V)
1
2
3
4
5
6
7


IOUT (DC) – VCC
OUT REVERSE
RL = 5Ω
OUTPUT CURRENT IOUT(DC) (mA)
SUPPLY VOLTAGE VCC (V)
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
3
4
5
6
7
8
9
10
11
12
13


ICCQ – VRI
VCC = 5V
Rg = 10kΩ
Vin = 0
QUIESCENT CURRENT ICCQ (mA)
INPUT REFERENCE VOLTAGE VRI (V)
0
5
10
15
20
25
30
35
40
45
50
55
60
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2

PRECAUTION USE

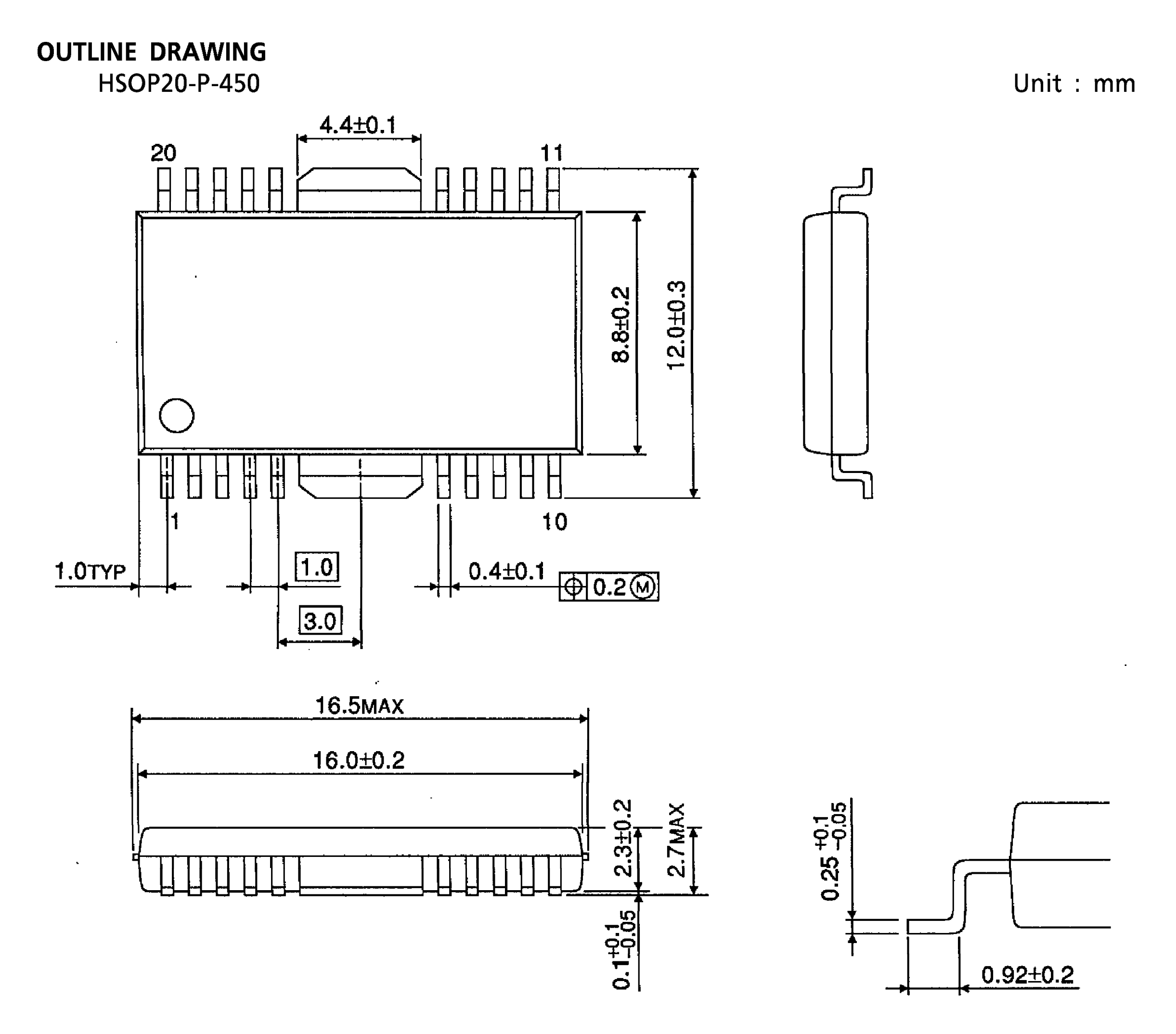
- Input Stage
  - Input stages are consisted of differential circuit of NPN Tr, and have built-in IB compensation circuit.
- Built-in Driver
  - Each channel driver consists of BTL configuration linear amplifier.
  - Voltage gain is fixed : $G_V = 15.5$dB (Typ.)
  - Voltage loss for output stage is $2V_{BE} + V_{CE}$ (sat) for positive cycle, V_{CE} (sat) for negative cycle, because of no-bootstrap circuit. So, output DC voltage is designed as less than $1/2V_{CC}$.
- V_{RI} Terminal
  - V_{RI} is reference voltage terminal for input signal.
  - If reference voltage from servo IC drop less than 1.8V, protection circuit operates and shut off bias circuit inside. This operation is to prevent load from moving undesirably in case of V_{RI} drop for accident or some reason.
- V_{CI} Terminal
  - Output DC voltage is determined by circuit of this terminal inside as ;
    $V_{CI} = V_{OUT\,(DC)} = (V_{CC} - V_F) / 2$
  - Output signal dynamic range is depend on V_{CC}. On the other hand, input signal dynamic range is determined by V_{RI} as mentioned and voltage gain is fixed inside. So, maximum output voltage does not increase as V_{CC} increases.
  - Because of BTL configuration, Ripple Rejection Ratio does not improve not much when capacitor is connected to V_{CI} terminal to GND.
- GND
  - Large signal GND is for output stage and small signal GND is for stages from input circuit to pre-output stage.
  - These GND pins are not connected inside.
  - Phin① and Phin② are connected to Bedflame, and it is connected to substrate.
  - It is advised that you make a Printed Board layout of small signal GND and large signal GND should be isolated each other.
- Oscillation preventive capacitor
  - We recommend to use the capacitor of 0.1μF, between each output terminals. But perform the temperature test to check the oscillation allowance, since the oscillation allowance is varied according to the causes described below.

  1) Supply voltage
  2) Ambient temperature
  3) Load impedance
  4) Capacity value of condenser
  5) Kind of condenser
  6) Layout of Printed board
- We recommend to connect Pass-condenser, which is about 10 to 100μF between V_{RI} terminal and GND.
- V_{CI} terminal is recommend to use "OPEN".

OUTLINE DRAWING

HSOP20-P-450

Unit : mm



Weight : 0.8g (Typ.)